Citation:

Harland JI, Garton LE. Whole-grain intake as a marker of healthy body weight and adiposity. *Public Helath Nutrition.* 2008 Jun; 11(6): 554-563.

PubMed ID: 18005489

Study Design:

Meta-analysis or Systematic Review

Class:

M - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

⊕ POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To review the scientific literature related to whole-grain intake and its effect on healthy body weight and adiposity.

Inclusion Criteria:

- Original epidemiology research: Cohort, cross-sectional or case studies in humans reported in full in peer-reviewed journals
- Clear definition and measurement of whole grains
- Use of suitable measures of body weight maintenance:
  - Body mass index (BMI)
  - Waist circumference (WC)
  - Waist-to-hip ratio (WHR)
- Reports that measured a range of whole-grain intakes in comparable populations, preferably a group with no or very low whole-grain intake, that could be compared with a population consuming about three servings per day or more, and that employed a suitable measure of body weight or adiposity.

Exclusion Criteria:

- Studies published before 1990
- Duplicates of the same cohort or study that were not the most recent report.

Description of Study Protocol:

Recruitment

- Medline and EMBASE were searched for articles published from 1990 through December

2006 and an additional hand search of key papers and publications was conducted

- Search terms included 'wholegrain or whole grain' and 'obesity or body weight or BMI or body fat' for Medline, and the addition of the term 'body measures' in EMBASE. The search was limited to those published in English or with a summary in English
- Reference lists of identified papers were used to find additional studies
- The data abstracted from studies was assessed for quality in three main areas: Recruitment and flow of subjects through the study; dietary assessment including definition of 'whole grain'; and treatment and reporting of data.

Design

Systematic review.

Statistical Analysis

- Mean values for BMI, WHR or WC were calculated using the lowest and highest whole-grain intake groups (usually about three servings per day)
- To calculate the pooled effect, each study was assigned a weight consisting of the reciprocal of its variance
- Estimates of mean difference were calculated by using a random effects model
- Publication bias was assessed using funnel plots.

Data Collection Summary:

Dependent Variables

Mean BMI, WC and WHR.

Independent Variables

Whole-grain intake: Lowest vs. highest (usually about three servings per day).

Control Variables

All studies made some adjustments for covariates, primarily:

- Age
- Gender
- Energy intake.

Description of Actual Data Sample:

- *Initial N:* 115 potentially relevant studies
- *Attrition (final N):* 15 reports (after applying exclusion criteria) with 20 data pairs representing 119,829 subjects
- *Location:* Study populations from UK, US, Iran, Sweden, Finland and Norway.

Summary of Results:

Key Findings

- Comparing high whole-grain intake to low or no whole-grain intake, the combined and

weighted mean BMI (using the random effects model) was reduced by 0.630kg/m^2 (95% CI: 0.460, 0.800)
- Waist circumference was reduced by 2.7cm (95% CI: 0.2, 5.2) in high vs. low or no whole-grain intake
- Waist-to-hip ratio was reduced by 2.3cm (95% CI: 1.6, 3.0) in high vs. low or no whole grain intake.

Other Findings

Body mass index reduction in women was marginally greater than in men, comparing high to low whole-grain intake.

Author Conclusion:

The consumption of about three daily servings of whole grains is associated with lower BMI and central adiposity.

Reviewer Comments:

- *Study strengths*
  - *Assessed publication bias using a funnel plot*
  - *Detailed table of study characteristics provided*
  - *Flow diagram of study selection presented*
- *Study limitations*
  - *The review only considered observational studies*
  - *Self-reported measures of height and weight were used in half the studies reviewed*
  - *Studies defined whole-grain intake inconsistently*
  - *Studies adjusted for different covariates, and the complexity of the models varied*
  - *The quality of specific studies was not discussed.*

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search termsused described?	Yes

3. Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?

Yes

4. Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?

???

5. Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?

???

6. Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?

Yes

7. Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issued considered? If data from studies were aggregated for meta-analysis, was the procedure described?

Yes

8. Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?

Yes

9. Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?

Yes

10. Was bias due to the review's funding or sponsorship unlikely?

Yes